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Hopkins, Nick; Reicher, Stephen

Published in:
Journal of Epidemiology and Global Health

DOI:
10.1016/j.jegh.2015.06.001

Publication date:
2016

Journal of Epidemiology and Global Health (2016) 6, 49–57

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REVIEW ARTICLE

The psychology of health and well-being in mass gatherings: A review and a research agenda

Nick Hopkins [a,*], Stephen Reicher [b]

[a] School of Psychology, University of Dundee, Dundee, UK
[b] School of Psychology and Neuroscience, University of St Andrews, St Andrews, UK

Received 7 May 2015; received in revised form 1 June 2015; accepted 21 June 2015
Available online 9 July 2015

KEYWORDS
Health benefit;
Health risk;
Mass gathering;
Psychology;
Sharing;
Social identity

Abstract Mass gatherings bring large numbers of people into physical proximity. Typically, this physical proximity has been assumed to contribute to ill health (e.g., through being stressful, facilitating infection transmission, etc.). In this paper, we add a new dimension to the emerging field of mass gatherings medicine. Drawing on psychological research concerning group processes, we consider the psychological transformations that occur when people become part of a crowd. We then consider how these transformations may have various consequences for health and well-being. Some of these consequences may be positive. For example, a sense of shared identity amongst participants may encourage participants to view others as a source of social support which in turn contributes to a sense of health and well-being. However, some consequences may be negative. Thus, this same sense of shared identity may result in a loss of disgust at the prospect of sharing resources (e.g., drinking utensils) which could, in turn, facilitate infection transmission. These, and related issues, are illustrated with research conducted at the Magh Mela (North India). We conclude with an agenda for future research concerning health practices at mass gatherings.

Contents

* Corresponding author at: School of Psychology, University of Dundee, Dundee DD1 4HN, UK.
E-mail address: n.p.hopkins@dundee.ac.uk (N. Hopkins).

http://dx.doi.org/10.1016/j.jegh.2015.06.001
2210-6006/

1. Introduction

In this paper, we draw on contemporary psychological understandings of crowd processes in order to add a new dimension to the emerging field of mass gatherings medicine. First, we consider research on the psychological transformations that occur when people become part of a crowd. Second, we review how these impact health and well-being. Third, we identify an agenda for future research.

Mass gatherings medicine addresses the health dangers that arise when large numbers of people come together for religious events (e.g., the Hajj or the North Indian Magh Mela), sporting events (e.g., the Olympics) or music festivals (e.g., Glastonbury). Mere proximity to so many people makes exposure to infection more likely [1]. Such risks are compounded by the rudimentary living conditions (e.g., poor sanitation) and the noise and crowding [2,3] that tend to characterise such events. These conditions bring their own health risks, and moreover, may make people less resilient (and less careful) in relation to the dangers of infection transmission. Altogether, this leads to well-documented risks of infection within both major religious [4—6] and nonreligious gatherings [1].

There is also potential for infection to spread beyond the gatherings themselves: people may come from many countries, mingle in the crowd, share their infections, and then take them home. In this way, mass gatherings can transform local outbreaks into global pandemics [7]. Not surprisingly, then, mass gatherings medicine research focuses on physical processes of disease transmission and views mass gatherings as a health problem.

This agenda has proved highly productive. It has motivated efforts to mitigate health risks through good planning, effective surveillance, and the implementation of basic prophylactic measures-such as wearing face masks [8,9]. Our intention is not to question such excellent work. Rather, we argue that the present agenda is partial in two important ways, and that the existing work needs to be complemented by an additional stream of studies and interventions.

Our first concern is that current work addresses physical factors in disease transmission but ignores psychological factors. Typically, the crowd is taken to be significant in terms of the simple number of people who are present and how the large number of people increases the probability of disease transmission. This overlooks the psychological transformations that occur when people become part of a crowd and how these shape behaviours relevant to disease transmission in particular and to health and well-being more generally.

Our second concern is that the emphasis on physical factors encourages a focus upon the negative impact of mass gatherings on health, thereby contributing to an approach to crowds which views them purely as a problem. Once one examines the psychological transformations that occur in crowds, the way is opened to a more nuanced approach which addresses both the health benefits and the health costs of mass gathering participation. Furthermore, it opens the way to practical interventions which not only mitigate risks, but also can harness the potential for mass gatherings to be a source of public health.

We start by outlining the social psychology of mass gatherings. We then consider how these social psychological processes may give rise to both health benefits and health risks. From this, we consider the types of intervention which could tip the balance from risks to benefits. Sometimes we draw on a solid research base. Sometimes we can be little more than illustrative because the necessary research remains to be done. Accordingly, we finish by outlining an agenda for future research into the psychological dimension of health and ill health at mass gatherings.

2. The psychology of mass gatherings

There is a longstanding view that when people enter crowds they lose their sense of self, lose their sense of judgement, and become capable of the most extreme actions [10]. However, over the last half century, this view has lost academic credibility. Instead, drawing on the social identity approach to group processes [11,12] (probably the most influential contemporary approach to

groups in psychology), researchers make a key distinction between a mere physical gathering, where a large number of people happen to be co-present at the same time (say shoppers in a market), and a psychological crowd, where those present see each other as belonging to the same broad social group (e.g., fans of a club at a football match, supporters of a party at a political rally, pilgrims at a religious event, etc.). In other words, a physical crowd is one in which people, despite being together, retain a strong sense of their unique personal identities. However, a psychological crowd is one where people perceive a common group membership and assume a shared social identity [13].

Where people experience a sense of shared identity, and form a psychological crowd, a number of psychological transformations occur which lead to a contrast with their conduct in terms of their unique personal identities. First, there is a cognitive transformation. People stop behaving in terms of their idiosyncratic beliefs and start behaving on the basis of shared norms, values, and understandings. People prioritise what is seen as valuable from the group perspective. In relation to this, people are influenced by others only to the extent that they are seen as group members and what they propose is seen as reflecting these shared ingroup belief systems [14,15].

Second, there is a relational transformation. That is, people see others in the crowd as part of the extended group self rather than as ''others''. This leads to a shift towards greater intimacy and much research shows how shared identity results in greater trust, respect, cooperation, mutual influence, helping, and also expectations of help from others [16–20].

Third, there is an emotional transformation. Indeed, observers often see an intense positive effect – what the sociologist Emile Durkheim famously dubbed ''effervescence'' [21] – as the most notable characteristic of crowds. Typically, observers have attributed this heightened affect to a loss of reason. However, recent research corroborates Durkheim's own suggestion that effervescence is tied to the meaningful nature of crowds for their participants [22]. Thus, people take great pleasure in the close and supportive relationships that we have just described as arising out of shared identity in crowds. More than that, such close relationships allow people to work together and to be more effective in reaching their shared goals. In the Mela, for instance, people help each other in overcoming the hardships of the pilgrim life and give each other space to live according to Hindu precepts. Such ''collective self-realisation'' is closely related to the joy of crowds [22,23].

It is important to stress that not all mass gatherings will exhibit these various transformations. Not all mass gatherings produce the underlying shared identity which is necessary for them to occur. This may be because people self-define in terms of their personal uniqueness. It may also be because the event is characterised by factionalism with people identifying in terms of a variety of different social identities rather than in terms of a common group membership [24,25]. Thus, we cannot assume that all participants at any one event will experience a sense of shared identity with all [23]. However, where individuals do see each other as members of a common social group, then there will be significant transformations in all that they think, feel, and do. This includes the cognitions, emotions, and actions that impact upon health and well-being. Let us now consider the various ways in which the psychology of crowds impacts health in general and processes of disease transmission in particular. We look, first, at the nature of the stressors which operate in mass gatherings to undermine health and resilience. Second, we consider participants' behaviour, and the ways in which people expose themselves to health risks.

3. Collective psychology and the nature of stress in mass gatherings

We noted above how the difficult conditions characterising mass gatherings are seen as undermining health, decreasing resilience, and increasing opportunities for infection and disease transmission. However, recent research suggests that collective psychology can alter the very nature of sensory experience. Therefore, while mass gatherings are often densely packed and extremely loud, it cannot be presupposed that crowding and noise constitute stressors and necessarily undermine health and well-being.

With regard to crowding, laboratory studies show that when others are regarded as in-group members with whom we have a shared identity, then we desire greater physical proximity to them [26]. These findings have been replicated and extended in field studies of mass gatherings. Thus, a recent study of hajjis shows that, far from finding dense crowds aversive, participants can feel safer when the crowds are denser. Importantly, this effect depends upon participants identifying with others in the crowd with the effect being mediated by the expectation that fellow hajjis will be supportive towards them [27]. Another study, conducted at a very different gathering (an outdoor music event), provides similar findings

[28]. Greater identification with fellow participants led to feeling less crowded (even when, objectively, the crowd was very dense) and to a more positive experience. In sum, crowd density is not necessarily a stressor. All depends upon how one represents those co-present in relation to oneself.

Research also shows that the noise associated with mass gatherings should not be assumed to constitute an aversive stressor. Noise has been described as ''sound out of place'' [29] which implies that our experience of an auditory stimulus is not simply a reflection of its intrinsic properties, but depends on the meanings attributed to it. The significance of this for the experience of mass gatherings is illustrated by experimental research conducted at the Magh Mela. The site, where pilgrims come for a whole month, is full of sound systems constantly broadcasting songs, speeches, and announcements. The average sound level is akin to that of a busy city street (85—90 dB) and this extends well into the night. In order to research how this noise was experienced, pilgrims listened to an ambiguous sound clip that could be labelled as coming either from the religious festival itself or a secular urban setting. In the former case, pilgrims found the clip more meaningful and interesting, less uncomfortable, and they also chose to listen to it for longer [30]. Moreover, we obtained evidence that this same clip was processed differently when it was labelled as coming from the Mela [31].

These experimental findings are corroborated by ethnographic research amongst pilgrims. Pilgrims denied finding the constant noise intrusive, at least as long as it was the noise of religious music and religious meetings [30]. One respondent referred to this as the sound of the Saraswati – the mythical river of knowledge which contributes to making the Allahabad Mela such a sacred site [32]. By contrast, the secular sounds of the public announcement system were found annoying.

For noise, as for crowding, the key point is that sensory experience is not a simple function of objective sensory characteristics. Social meaning matters and this meaning is bound up with whether the stimulus is consistent or inconsistent with one's social identity. In the case of crowding, this is a matter of whether others do or do not share one's group membership [27]. In the case of noise, it is a matter of whether the sound is or is not an expression of the group's culture [30].

Thus far, our argument has been that an understanding of collective psychology leads us to rethink what constitutes a stressor in the crowd and that many characteristics of mass gatherings conventionally seen as stressors may not be experienced as such. This amounts to arguing that mass gathering settings might not be quite as bad for health and well-being than they have been seen to be. However, there is evidence to suggest that we can go further. Mass gatherings may, in some ways, actually bring health benefits.

A critical element here is social support. A growing body of research shows how shared social identification in a group leads to an increased sense of social support from others, which leads to a greater sense that one can cope with difficult circumstances which decreases stress, resulting in improved mental and physical well-being. These relationships have been shown for people working in demanding jobs [33,34], for the elderly in old age homes [35], for soldiers in army units [36], and also, more generally, amongst members of local communities [37,38]. Indeed, such is the scale of this evidence that social psychologists refer to building shared identity as the basis of a ''social cure'' [39].

Critically, for the present argument, there is evidence that the ''social cure'' operates in mass gatherings. We have already reported evidence from the Hajj to show the link between shared identity, expectations of social support, and greater positivity about the crowd [27]. We also have evidence from the Magh Mela which demonstrates the final link to improved well-being [40]. In this latter, Tewari et al. [40] researched a sample of participants and a sample of comparable nonparticipants. The research was longitudinal. Before the mass gathering took place, both samples reported very similar levels of self-assessed health and symptoms of ill health. Three months later and after the Mela, the two samples differed with those undertaking the pilgrimage reporting better self-assessed health and fewer symptoms of ill health than the controls. Moreover, the extent of participants' health improvements from before to after the event were related to the extent that they had a sense of shared identity and a sense of relational intimacy with fellow pilgrims during the event [41].

It is important to acknowledge this is preliminary work. First, it relies on self-reported measures of health, and although these correlate well with more objective measures [42], future studies should collect physiological data too. Second, it only measures post-event health at roughly 1 month afterwards. It would be desirable to design studies which take multiple post-event measures in order to see how long any effect endures. Third,

we do not know the physiological mechanisms through which any such effects are caused. An obvious candidate is immune function [43]. Again, it would be desirable to investigate such mechanisms in the future. So clearly, more research is needed. Nonetheless, this evidence suggests a broad reappraisal of the relationship between mass gatherings and health. Rather than seeing such events purely as a problem and as a threat to global health, we need to address both the negatives and the positives. As well as constituting a motor for global pandemics, mass gatherings may also provide a basis for health benefits at a societal level.

4. Collective psychology and health practices

In arguing that mass gatherings can be both good and bad for health, we are certainly not suggesting that the former relate to psychology and the latter to medicine. Rather, we wish to bring psychology and medicine together and consider how each of the psychological transformations we have described impacts upon health-related practices in mass gatherings.

Starting with the cognitive transformation, those who identify with a group shape their behaviour by reference to collective norms and values rather than their own individual values. These norms will be specific to a given group and hence will vary between different gatherings: the norms at religious festivals are characteristically a matter of abstinence while at music festivals they are more to do with excess. Thus, rather than making general claims, we need to address how the specific norms and values of a particular mass gathering impact the extent to which people expose themselves and respond to health risks.

At the extreme, there are cases where everyday health values are inverted. At the Hajj and the Magh Mela, for instance, participants' understandings of the location and event may diminish their concerns about health. In Hindu traditions, pilgrimage is closely bound up with beliefs concerning the gaining of religious merit [44] and such beliefs may mean that physical health loses its value. Not only may there be concerns about gaining religious merit, which attenuate everyday concerns about health, but there is historical evidence that death at some Hindu pilgrimage sites may be embraced rather than feared [45]. Similar beliefs about the desirability of death after having just completed a purifying pilgrimage may also be found in other religions [46].

In addition to this, there may be normative practices which, while not specifically intended to cause ill health, nonetheless put people at greater risk [47]. Thus at the Magh Mela, predominantly elderly pilgrims commit to bathe in the cold and polluted Ganges [48]. This can have serious consequences for their health and has been shown to result in an increase in the number of cases of non-bloody diarrhoea [5]. To take another example, at the annual Hindu festival at the Lord Murugan Temple of Nallur in Jafna, Sri Lanka, pilgrims soak in the temple's water tank before performing rituals while lying on sand. This leads to infections of the skin (cutaneous larva migrans) caused by parasitic larvae. Moreover, not all pilgrims regard this as a problem that should be avoided: some believe it to be a sign of divine grace [49]. Here, then, we begin to see some of the negative impacts of collective norms (and beliefs) on health.

Moving on to the relational transformation of crowd psychology, there are a number of general consequences which flow from the sense of intimacy, empathy, trust, and respect, associated with a shared identity. Some of these consequences may be positive for health. For example, feelings of intimacy and empathy result in greater sensitivity to others' well-being, making it more likely that others' health needs will be noticed and that people will help those who are unwell (e.g., through sharing medicines, giving them water, etc.). This empathy to others' predicaments may also lead people to help each other when they are struggling with the harsh conditions that characterise many mass gatherings. For example, pilgrims at the Magh Mela report helping each other endure and overcome the bitter weather that make living on the banks of the Ganges in simple tents and bathing in the cold Ganges waters a testing ordeal [48].

Yet, other consequences may be more negative for health. For example, the sense that social support is available from one's fellows [48] can lead people to overlook symptoms that actually indicate a health problem. Indeed, it is likely that this can result in them continuing when they should in fact stop and seek medical help. Moreover, by continuing, they may expose themselves to further risks that compound their original vulnerability. Perhaps more worryingly, the relational transformations that flow from a sense of shared identity in crowds, notably the sense of trust and empathy, may lead people to relax normal precautions in dealing with others. Specifically, they may be more willing to share resources (e.g., food, eating implements, clothes etc.) in such a way as to make the

transmission of infection more likely. Certainly, previous research has shown how shared resources (such as the use of the Christian 'communion cup' in religious ceremonies) can be a vehicle for infection transmission [47]. At present, although the sharing of resources in mass gatherings is recognised as a potential vehicle for infection transmission [50], we know little about how such sharing may be facilitated by a shared identity. For example, although Hindu pilgrimage is often associated with giving to others, the question of who may give and who may receive is complicated by norms of caste [51].

Research on resource-sharing and its implications for the spread of infection should be a priority for the future. Any studies need to be sensitive to the different forms of sharing that occur in different types of event. In music festivals, for instance, females' sharing of lipstick and other cosmetics may be of relevance. In the Hajj, there are specific ritualised acts, such as head-shaving, where the sharing of razors may be an issue [52]. There may also be issues concerning the cleaning of one's teeth before prayer, where hajjis may share dental sticks [52]. In addition to such cultural sensitivities, it is equally important to consider different aspects of the sharing process. That is, there is a need to address when people are willing to offer resources to others, when people are willing to accept resources from others, and when people find it difficult to refuse resources that are offered even when they are reluctant. Finally, there is a need to address the mechanisms underlying such sharing processes. We have referred to empathy and trust, but a further dimension is disgust, a critical determinant of how we respond to physical contact with others and one which is clearly affected by who is seen as ''us'' or ''them'' [53]. We have unpublished data to suggest that shared identity attenuates the disgust that we feel in relation to close intimacy with unknown others. For example, shared identity reduces the disgust in response to the smell of others; but does this extend to our feelings about sharing food, or drink, or dental sticks with others? There is clearly wide scope for work in this area.

This last discussion brings us to the emotional transformations brought about by crowd psychology. We have discussed in some detail the positive health consequences which derive from shared identity, social support, and the extreme emotional positivity associated with these. People feel less stressed, more efficacious, and safer, even in the densest of crowds [27]. However, there is a downside to this in that it might lead people into a false sense of security and encourage them to enter or linger in sites where there is a real danger of crushing.

A sense of positivity may lead people to expose themselves to danger in other ways. At the Magh Mela, people bathe in and even drink highly polluted Ganges water in the belief that this water is spiritually pure [51]. Moreover, some pilgrims report feeling so good at the event, that they stop taking their usual medicines. All in all, we see, once again, that the psychology of crowds affects behaviour in multiple and complex ways that can be bad and good for health. It is by clarifying and untangling these various influences that we can begin to design interventions that can boost the positive while mitigating the negative. However, just as an analysis of health practices in mass gatherings requires a rounded understanding of collective psychology, the same is true when considering how to design effective health interventions.

5. Designing health interventions in mass gatherings

The collective psychology that we have outlined is also a psychology of influence. That is, if those who act as group members seek to conform to the norms and values of the group, then they will be influenced by those who are in a position to clarify these constructs (notably, those seen as ingroup members) and by messages which are seen as consonant with them [12,17,54]. To use somewhat less technical language, one can rarely influence people from the outside by telling them what they ought to do. Instead, one should aim to influence them from the inside, working with their group-based social identities rather than against them [55]. This means understanding the values and social norms which characterise the group one seeks to influence, working with ingroup sources, and crafting a message which links interventions to these values/norms [55]. To date, there is only a small amount of suggestive material that relates these insights specifically to mass gatherings. Some concerns the issue of wearing face-masks at the Hajj to prevent disease transmission. Simple injunctions are unlikely to be effective in this case, especially for women, since many believe they should not cover their face while in Ihram (a sacred state necessary for properly performing the sacred rites) [56]. Accordingly, any successful intervention must address this normative prohibition. Thus, in 2009, the Grand Mufti of Saudi Arabia made a distinction between ''covering the face''

and the wearing of masks, thus opening the way to their usage during the Hajj [57].

The important thing to note here is both that the source of the message (the Mufti) was an exemplary member who was in a position to define ingroup (Islamic) norms and also that the message itself was attuned to the consonance or dissonance between relevant acts (mask wearing) and group beliefs (Ihram). It is equally important to note that this relationship of consonance or dissonance was not given in advance, but was rather a matter of argument. This opens up the possibility that, with sufficient cultural knowledge and creativity, other health-harming practices can be redefined as going against the group norms, or health-promoting practices may be defined as expressing such norms.

To take just one possible example, we have already alluded to the fact that a sense of ''heroic endeavour'' is often defined in terms of continuing to perform group rituals when one is unwell, say through infection. As simple health warnings are generally ineffective [58], it may be possible to redefine such behaviour as counter-normative by emphasising how it puts fellow participants at risk. Moreover, it may be possible to redefine true heroism not as carrying on regardless, but as staying behind, not completing rituals and hence putting the collective first.

6. Implications and conclusions: an agenda for research

In this paper we have sought to do three things. The first, and most basic, has been to argue that we need to incorporate a psychological dimension in the study of health and well-being in mass gatherings. Without this we will be unable to understand fully either the nature of the dangers (and opportunities) that people confront, or why they act in ways that expose them to these dangers (and opportunities). Much of our review has catalogued the various ways in which crowd psychology impacts upon participants' perception and experience of stressors and their health-related practices, acknowledging both that there are general processes that affect all mass gatherings and that, in applying these, we need to be attentive to the specific cultures of particular gatherings.

As already implied here, our second aim has been to provide a more balanced view of mass gatherings which acknowledges their potential for improving health as well as their potential for harming it. In other words, we should not approach mass gatherings with an exclusively ''problem'' perspective. While there may be an increase in the risks of infection, exhaustion, exposure to the elements, etc., only a minority may be afflicted. For the rest (and hence, statistically, in overall terms) there may be health benefits such that mass gatherings may be a means to improve public health.

Our third aim was to begin to consider how this knowledge might be applied in designing effective health interventions in mass gatherings. Here too, our core point is that an understanding of crowd psychology is needed. It is no good professionals telling crowd members what we consider to be good for them, because our notion of the good may well differ from theirs. Rather we must design interventions that are attentive to group notions of who and what is credible.

In developing our arguments, we have drawn on the available evidence base. But this work is still in its infancy. What is more, with few exceptions, the existing studies concentrate on just two events – the Hajj and our own investigations of North India's Magh Mela. As well as a review of what has been done, this paper is intended to develop an agenda of what still needs to be done. We see three priorities at conceptual, descriptive, and practical levels.

Conceptually, we need to clarify the processes underlying the phenomena we describe. Notably, when it comes to those health practices (such as resource-sharing) which underlie disease transmission, to what extent are trust, empathy, and particularly, disgust involved? Can we demonstrate conclusively that shared identity attenuates disgust and that lowered disgust is at the root of risky practices?

Descriptively, we need to map the way that health and health practices alter in mass gatherings and whether overall health is affected by participation in different types of mass gathering. Also, we need to identify the key practices which impact upon health in different crowds. As we have repeatedly stressed, this needs to take local context into account. Therefore, the dangers one exposes oneself to and the resources one shares at a rock concert will evidently be different to those that are relevant at the Hajj.

Practically, we need to design interventions rooted in the mapping exercise described above and we need to examine the extent to which these are effective. In this, we draw on an aphorism of Kurt Lewin [59] which is much cited in social psychology: ''there is nothing as practical as good theory''. This cuts both ways. On the one hand, our conceptual understanding of crowd processes lies at the base of effective practical interventions.

Conversely, the ability to intervene effectively is a mark of the strength of the underlying theory.

To conclude, it is helpful to recall a memorable moment in our Magh Mela research. We were talking to some pilgrims in their camps; it was crowded, it was (to us) almost unbearably loud, and the sanitary conditions were rudimentary at best. By all the conventional criteria of health research, these should be conditions that subvert health. Yet, when we asked the pilgrims to explain how they felt, one replied ''go back and tell your friends that this is bliss''. All the others nodded vigorously. Our attempt has been to show that when it comes to health and well-being, mass gatherings are simultaneously the best of worlds and the worst of worlds, and to insist that we should not let the focus on the one obliterate awareness of the other. Rather, the challenge is to use a combination of psychological and medical understanding to ensure that the balance is tipped from the worst to the best.

Conflicts of interest

The authors have no conflicts of interest to declare.

Acknowledgments

Funding ESRC (UK) research grant 'Collective participation and social identification: A study of the individual, interpersonal and collective dimensions of attendance at the Magh Mela' (RES-062-23-1449).

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